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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/529,304	03/25/2005	Roger Guevremont	151-16 US/PCT	2126

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EXAMINER	
JOHNSTON, PHILLIP A	
ART UNIT	PAPER NUMBER
2881	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/06/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/529,304	GUEVREMONT, ROGER	
	Examiner	Art Unit	
	Phillip A. Johnston	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 January 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28 and 30-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28 and 30-38* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 March 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Detailed Action

1. This Office Action is submitted in response to the amendment filed 1-18-2007, wherein claim 29 was canceled, claim 37 was amended, and claim 38 was added. Claims 1-28, and 30-38 are pending.

Response to Arguments

2. Applicant's arguments filed 1-18-2007 have been fully considered but they are not persuasive.

3. Applicant argues at page 11 of the remarks that Spangler does not teach the invention in as complete detail as is claimed at claim 1 currently of record. In particular, Spangler discloses various ion mobility spectrometer (IMS) and ion mobility storage trap (IMST) designs. Spangler teaches that an oscillating asymmetric potential is superimposed on a dc potential and applied across electrodes of the IMST (col. 8, lines 53-65; col. 12, lines 17-60; col. 14, lines I-I 1). That said, Spangler does not teach nor does he suggest that an AC (RF) only mode is utilized to extract ions from the IMST.

4. The examiner disagrees. Spangler teaches at Col. 6, line 33-44 that, ions are separated in an ion mobility storage trap (IMST) with the aide of asymmetric AC and variable DC potentials applied across the electrode structure defining the trap volume. In response to the asymmetric AC and DC potentials, the ions are gathered and temporarily stored in the trap volume as they oscillate about preferred equilibrium position(s). The ions are then scanned out of the trap by varying one or more parameters (e.g., magnitudes, phases, etc.) of the AC or DC potentials, and/or their ratios, between predetermined limits.

Spangler also teaches at Col. 14, line 32-64 how the movement (trajectory) of ions in the trap are affected by the AC components of the applied potential, particularly pointing out at Col. 14, line 61-63 that, In addition to the DC potential, the amplitude or phase relationships within the AC asymmetric potential can be used to scan the ions out of the trap.

Spangler further teaches at Col. 15, line 23-37 a method of operating an ion mobility trap (see Figure 18 below) where, in step S2, a sample is introduced into the trap volume. The sample is ionized in step S4. The ions are separated according to their mobility characteristics in step S6 by applying the appropriate potentials across the electrodes and causing the ions to migrate to their equilibrium positions.

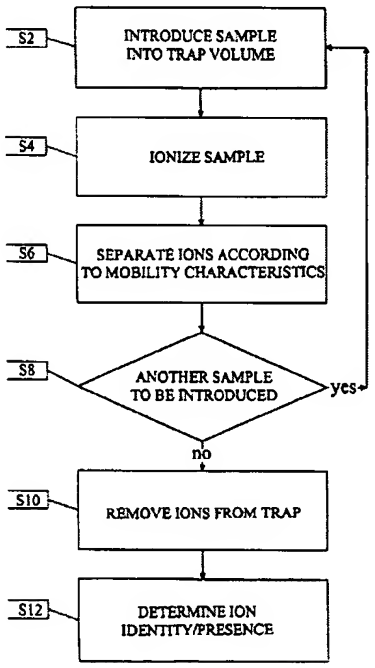

FIGURE 18

A decision is made in step S8 whether another sample should be introduced (or continued to be introduced). If another sample is introduced, the process repeats step

S2, S4, and S6. If no further samples are introduced, the process proceeds to step S10. In step S10, the ions are removed from the trap. The ions may be sequentially scanned from the trap by changing one of the DC potential components, the AC potential components, or a combination thereof. In step S12, the identity of the ions removed from the trap are determined and correlated with the sample.

The examiner has interpreted from the Spangler teachings above that scanning ions out with AC potential components would include the AC-only (rf-only) component.

In comparison, claim 1 of the instant application recites a method of separating ions comprising the steps of: providing an analyzer region that is operable in both an if-only mode and in a FAIMS mode (step 2 above); introducing ions into the analyzer region (step 3 above); effecting a selective separation of the ions within the analyzer region substantially during operation in the FAIMS mode (step 6 above); and, extracting the selectively separated ions from the analyzer region substantially during operation in the rf-only mode (step 10 above).

It should be pointed out here that, the applicant defines the claim 1 FAIMS mode of operation at [0011] as applying the appropriate combination of asymmetric waveform and DC potentials, which Spangler describes equivalently at Col. 9, line 50-67; and Col. 10, line 1-8.

In addition, Spangler clearly states that during AC-only operation of the trap shown in Figures 20A through 24B, no DC potential component is applied. See Col. 7, line 64-67.

Thus it is the examiners opinion that since Spangler teaches the claimed FAIMS operation of an ion mobility trap, using the claimed appropriate combinations of asymmetric waveform and DC potentials, followed by removal of the previously separated ions from the trap with an AC-only component, then Spangler anticipates claim 1 of the instant application.

5. The applicant argues at page 14 of the remarks that, applicant respectfully submits that none of the portions of the Spangler reference as identified by the Examiner teaches "a set of parallel rods having a space therebetween, the space having first and second ends and defining an analyzer region."

6. The examiner disagrees. Page 2 of the Office Action clearly describes the Spangler recitation of a quadrupole ion trap having parallel rods at Col. 4, line 25-47.

7. The rejection of claims 1-6,8,11,12,14,17-22,25-28, 30-34,36,37 under 35 USC 102(b) by Spangler is maintained.

8. The rejection of claims 7,9,10,13,15,16,23,24, and 35 under 35 USC 103(a) by Spangler, in view of Whitehouse is maintained.

9. All claims stand finally rejected.

Claims Rejection - 35 U.S. C. 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-6,8,11,12,14,17-22,25-34,36,37, stand rejected under 35 U.S.C. 102 (b) as being clearly anticipated by Spangler, U. S. Patent No. 6,124, 592.

3. Regarding Claim 1, Spangler teaches a number of ion mobility spectrometer (IMS) and trap (IMST) designs, where high field strength asymmetric waveforms (FAIMS mode) are applied to electrodes for ion separation (Col. 8, line 53-65; Col. 12, line 17-60; and Col. 14, line 1-11), and where an AC (RF) only mode is utilized to extract ions from the trap. Col. 7, line 43-63; Col. 23, line 5-65.

In one particular example, the applied asymmetric AC and DC voltage focuses and stores the ions at specific locations within trap volume 41, after which the asymmetric AC potential is removed and an accelerating potential is applied across electrodes 1 and 2, causing the ions to be injected into drift tube 62 for subsequent mobility analysis. See Col. 25, line 65-67; Col. 26, line 1-6; and Figure 38 below.

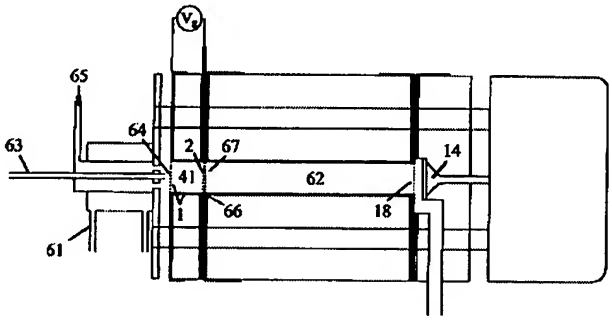

FIGURE 38

4. Regarding Claims 2,4,20-22, and 25, Spangler teaches trapping ions in an IMST where ions from a source are focused through a lens (note Fig. 5 and 38 above) into a quadrupole (parallel rod) trap by first applying an RF voltage (first mode), then asymmetric AC and DC potentials are applied (second mode) across the electrodes

and scanned by controller 13 which causes the ions to migrate towards an equilibrium position within the trap volume, and subsequently ejecting ions by applying a combination of RF and DC potentials to the electrodes. See Col. 5, line 28-33; Col. 9, line 50-67; Col. 10, line 1-5; and Figure 10A.

5. Regarding Claims 3 and 6, Spangler teaches turning off the asymmetric AC potential prior to ejecting the separated ions and removing the ions from volume 7 using scan controller 13, the high voltage power supply 19 and switches 20 and 21 remove the ions by temporarily applying an accelerating potential across the electrode structure of the trap. Col. 10, line 18-31.

6. Regarding Claims 14,26,27,30, and 31, Spangler teaches the use of parallel rods in quadrupole, hexapole, and octapole ion mobility analyzer/trap structures. Col. 4, line 27-48; and Col. 5, line 63-67.

7. Regarding Claims 5 and 8, Spangler teaches continuous filling or refilling during the separation and extraction periods. See Fig. 18; Col. 15, line 23-33; and Col. 23, line 39-55.

8. Regarding Claims 28,29, and 37, Spangler teaches switching potentials applied to the mobility analyzer (trap) region as described above regarding claims 3 and 6, and that the trap volume is filled with a neutral gas (bath, carrier, or drift), where the ions experience energy loss due to collisions (collisional cooling) which promotes separation based on mobility. Col. 1, line 10-32; Col 15, line 56-64.

9. Regarding Claims 11,12,32,33, and 36 Spangler teaches changing AC or DC potentials and/or phase of the asymmetric potential prior to extracting ions to a detector. Col. 6, line 3-50; Col. 14, line 61-63; Col. 15, line 34-44.

10. Regarding Claims 17-19, Spangler teaches operating the trap at pressures of at least 5×10^{-3} to Atmospheric pressure. Col. 21, line 24-31.

Claims Rejection – 35 U.S.C. 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 7,9,10,13,15,16,23,24, and 35 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,124,592, to Spangler, in view of Whitehouse, U.S. Patent No. 7,034,292.

13. Regarding claims 7,9,10, and 13, Spangler teaches all the required limitations therein, as pointed out above regarding claims 1 and 20; as well as 5 and 8.

14. Spangler fails to teach confining ions to a smaller volume due to collisional cooling.

15. Whitehouse teaches that collisional focusing creates a narrower beam profile (smaller volume than occupied prior to collisional cooling). Col. 25, line 29-35.

16. Whitehouse modifies the Spangler method to provide collisional focusing.

17. Therefore it would have been obvious to one of ordinary skill in the art that the ion mobility analyzer and trap of Spangler can be modified to use collisional focusing in accordance with Whitehouse, to provide for precise ion focusing through the lens' and into the time of flight pulsing region.

18. Regarding claims 15 and 23, Spangler teaches all the required limitations therein, as pointed out above regarding claims 1 and 20.

19. Spangler fails to disclose the use of a plurality of rod segments.

20. Whitehouse teaches the use of a multipole ion guide operated in RF only mode, where the multipole ion guide is configured with plural segmented rods (Note Figure 14). See Col. 18, line 57-64.

21. Whitehouse modifies the Spangler method to provide segmented rods.

22. Therefore it would have been obvious to one of ordinary skill in the art that the ion mobility analyzer and trap of Spangler can be modified to use the segmented rods in accordance with Whitehouse, to provide an axial voltage along the rod segments, thus providing a force component to aid in moving ions through the ion guide volume to reduce transmission losses.

23. Regarding claims 16,24, and 35, Spangler teaches all the required limitations therein, as pointed out above regarding claims 1 and 20.

24. Spangler fails to disclose the use of different voltages between different rod segments including a DC gradient along the segments.

25. Whitehouse teaches the use of a multipole ion guide operated in RF only mode, where ion guide segments provide electrical and functional decoupling of

adjacent segmented ion guide rod sets, where some or all can be driven by separate power supplies (Note Figure 2A and 2B; and Col. 28, line 35-55). Whitehouse further teaches the use of a DC gradient applied along the axis of plural rod segments. Col. 42, line 3-18.

26. Whitehouse modifies the Spangler method to provide segmented rods which are electrically and functionally isolated to allow ions to pass between ion guides or to trap ions in ion guides with gated release into adjacent ion guides or the downstream mass to charge analyzer.

27. Therefore it would have been obvious to one of ordinary skill in the art that the ion mobility analyzer and trap of Spangler can be modified to use the segmented rods in accordance with Whitehouse, to provide an axial voltage along the rod segments, thus providing the ability to conduct multiple ion fragmentation, mass to charge selection and scanning functions in plural ion guides.

28. Regarding amended claim 37 and new claim 38, The rational applied above to claim 37, also applies to amended claim 37 and new claim 38.

Conclusion

29. The Amendment filed on 1-18-2007 under 37 CFR 1.131 has been considered but is ineffective to overcome the references cited in the Office Action mailed 10-18-2006.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

30. Any inquiry concerning this communication or earlier communications should be directed to Phillip Johnston whose telephone number is (571) 272-2475. The examiner can normally be reached on Monday-Friday from 6:30 am to 3:00 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiners supervisor Robert Kim can be reached at (571) 272-2293. The fax phone number for the organization where the application or proceeding is assigned is 571 273 8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PJ
March 29, 2007

ROBERT KIM
SUPERVISORY PATENT EXAMINER